HIGH VOLTAGE AMPLIFIER
高壓放大器



INSTRUCTION MANUAL
使用說明書

CE

HA-205 *170Vp-p / 450mA / 3MHz*

HA-305 *300Vp-p / 300mA / 100KHz*

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PINTEK High Voltage Amplifier Selection Guide

2010.Apr 05

MODEL	HA-205	HA-305	HA-400	HA-405	HA-800	HA-805
Output DC Voltage (Max.)	± 85V	± 150V	± 200V	± 200V	± 400V	± 400V
Output AC Voltage (Max.)	170Vp-p	300Vp-p	400Vp-p	400Vp-p	800Vp-p	800Vp-p
DC Current (Max.)	± 450mADC	± 300mADC	± 80mADC	± 200mADC	± 35mADC	± 100mADC
AC Current (Max.)	900mAp-p	600mAp-p	160mAp-p	400mAp-p	70mAp-p	200mAp-p
Output Power (Max.)	76 VA	90 VA	32 VA	80 VA	28 VA	80 VA
Power Bandwidth (Typ.)	3 MHz/100Vp-p	100KHz/150Vp-p	600KHz/200Vp-p	1 MHz/200Vp-p	200KHz/400Vp-p	300KHz/400Vp-p
Slew Rate (Typ.)	2500V/us	50V/us	300V/us	500V/us	200V/us	300V/us
Output Resistance (Protection SW OFF)	10Ω	10Ω	50Ω	50Ω	100Ω	100Ω
Output Resistance (Protection SW ON)	500Ω/80watt	500Ω/80watt	4KΩ/40watt	2KΩ/80watt	15KΩ/40watt	7.5KΩ/80watt
Safe Loading	≧190Ω/170Vp-p	≧500Ω/300Vp-p	≧2.5KΩ/400Vp-p	≧1KΩ/400Vp-p	≧11KΩ/800Vp-p	≧4KΩ/800Vp-p
Input Voltage	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p
Voltage Gain	0～35	0～60	0～90	0～90	0～180	0～180
DC OFFSET	0 or ± 80V	0 or ± 150V	0 or ± 200V	0 or ± 200V	0 or ± 400V	0 or ± 400V
Monitor Output	100：1	100：1	100：1	100：1	100：1	100：1
Output Protection	1.Protection Resister 2.Microprocess Control.	1.FUSE 2.Protection Resister 3.Microprocess Control.	1.FUSE 2.Protection Resister	1.FUSE 2.Protection Resister 3.Microprocess Control.	1.FUSE 2.Protection Resister	1.FUSE 2.Protection Resister 3.Microprocess Control.

HA-205

HIGH VOLTAGE AMPLIFIER

1. SUMMARY

HA-205 is a very practical high voltage amplifier in testing and measuring industry. Its dimension is small, light weight and easy operation. The max voltage output is able to reach 170 Vp-p. The various advantages are very useful for users operation.

HA-205 serial current output is able to reach 450 mA, and it has output protection switch. In the output protection mode, it protects HA-205 not damaged when get shorts or overload from outside. This can lower the defects and extend the unit lifetime.

The max voltage gains is 35 times, and the output is able to adjust from 0V ~ 170Vp-p (use 10 turns variable resistor), and maximum frequency is 4MHz (basic voltage output 100 Vp-p). These applications are suitable for different industries,

- Semiconductor High Voltage Driver
- TFT Field High Voltage Driver
- High Voltage Engineering
- MEMS Engineering
- Nano Technology
- PZT Driver
- Static Charge Engineering
- Biomedical Engineering

It is also used for Audio Signal Generator and Function Generator Amplifier.

2. SPECIFICATIONS

(1) Input

Input Voltage:

0 V ~ +/- 2.5 V (5 Vp-p), maximum +/- 10 V (20 Vp-p)

Input Frequency:

DC ~ 4MHz. Over frequency will get attenuate, but not damage the unit.

Input Waveform: Direct current and any waveforms

(2) Output:

Output Voltage:

≦0 V ~ +/- 85 V (170 Vp-p).

Voltage Gain:

≦ 0 ~ 35 times. Front panel indicates AMPL. It is 10 turns adjustable serial resistor.

Maximum Output Current:

≦ 450mA (Protection SW OFF); ≦ 170mA (Protection SW ON)

Output Bandwidth: DC~4MHz (Basic Voltage Output 100Vp-p)

Slow Rate: 2500 V/us(Typ.)

Output Resistance:

10Ω(Protection SW OFF); 500Ω(Protection SW ON)

Output Protection: One switch control

Output protection sets “ON”, the output resistance raise up to 500Ω. At this time, even the positive and negative terminals get short but will not damage the unit.

Output protection sets “OFF”, the output resistance down to 5 Ω. It is PROHIBITED the output terminals get short. The serial output also needs to set under 450mA. (output 170Vp-p, the overload resistance needs 190Ω up, to protect the unit from damage)

DC Voltage Offset: ≦0 ~ +/- 80 V DC, it is controlled by 10 turns adjustable resistor.

DC Voltage Offset Switch: One switch control.

When switch sets OFF, inside DC is 0V.

When switch sets ON, front panel indicates OFFSET control.

Monitor Output:

-40dB, the output voltage are about 1/100 as the main output terminal, resistance is 10KΩ, maximum output ≦1.7 Vp-p. It is able to direct connect to oscilloscope to observe.

(3) Input Power: AC 100 V ~ 240 V +/- 10%, 50 ~ 60 Hz

(4) Power consumption: Max 150 W

(5) Fuse: 3.0A/250V, back panel under power core fuse box

(6) Operation: 0~40°C; 0~80%RH

(7) Storage: -20~60°C; 0~90%RH

(8) Dimension: 270 (W) x 95 (H) x 310 (H) mm

(9) Weight: 5.2 KGs / 11.5 PB

(10) Out Put protection.

(A)Built-in output fuse.

(B)Built-in Output Protect resistor.

Switch "ON" the Protect Switch. The output impedance of the equipment will be raised up to the Desired output resistor. The output current will be limited to protect the equipment even the output was shorted.

(C) Micro Process Overload Protection:

LED Slow Flash : The equipment was under Warming Up after switch ON or re-switch ON.

LED Quick Flash : The Micro Process have detected the Over Load. The equipment will be switch off and re- switch on automatically. The LED will Slow Flash and than quick flash. The process will be continually till the Over Load been Improved.

3. FRONT PANEL INDICATION

Figure 1.



① **Power On:** Turn on Power and LED light on.

② **DC Voltage OFFSET:** use 10 turns adjustable resistor is able to gain precised voltage. The “OFFSET Switch” must be set at ON position.

③ **AMPL adjustment:** use 10 turns adjustable resistor for micro adjustment. It is able to have 0 ~ 35 times voltage gains.

④ **Input:** ≦ 0 ~ +/- 2.5 V. Maximum do not over +/- 10 V.

⑤ **Oscilloscope Monitor:** Attenuate (100:1) -40dB. Maximum voltage output 1.7 Vp-p. It is safe to connect with oscilloscope to observe.

⑥ **Output:** 0 ~ 170 Vp-p or 0~ +/- 85V DC.

⑦ **DC Voltage OFFSET switch:** When the switch sets “ON”, please tune (2) knob. The DC is ≦0~+/- 80V. When switch sets “OFF”, it is back to DC 0V.

⑧ **Output Protection Switch:** Suggest to use this function under "Normal" situation. When switch sets "ON" is able to prevent the unit damage from short. When output connects with high voltage, it can resist the voltage. The bandwidth is not attenuate, but the resistance will raise up to 500Ω. Overload will increase and output current will decrease.

When switch sets "OFF", please be careful of using this unit. It is PROHIBITED the output terminals get short.

4. BACK PANEL INDICATION

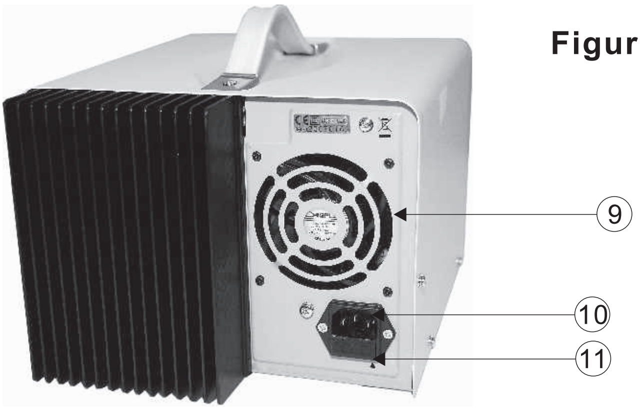


Figure 2.

⑨ **Fans:** suck out type. 24V / DC / 0.11A

⑩ **AC Power plug:** Please connect properly with enclosed power cord.

⑪ **Fuse:**

Power	Frequency	Fuse
100~240V +/- 10%	50/60 Hz	3.0 A/250V

5. OPERATING

5.1 Use Function Generator as input terminal, and directly connect HA-205 Monitor to Oscilloscope to observe the real amplified situation (Figure 3.)

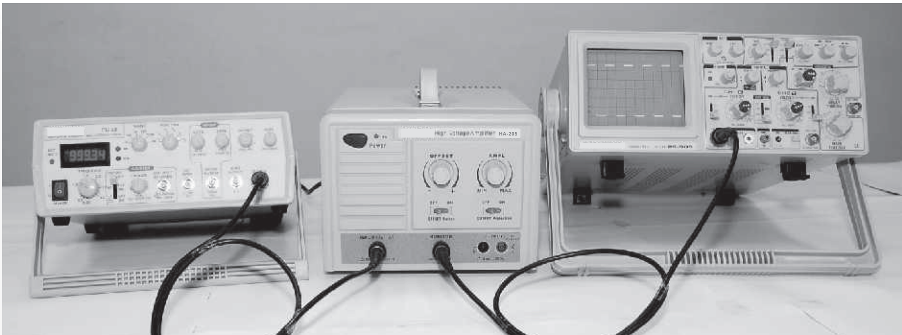


Figure 3.

A. Set Function Generator frequency at 0 ~ 3MHz. (Over frequency will not damage HA-205, but output will be distorted)

B. Waveform Selection: Any

C. Input Amplitude sets within 5Vp-p, but it is safe to set input within 20Vp-p. HA-205 maximum output need to remain at 170Vp-p, over this the waveform will be cut off.

D. Use BP-250 to connect HA-205 Monitor terminal to oscilloscope. The oscilloscope amplitude multiply 100 is HA-205 real output.

E. Monitor terminal maximum output is only 1.7Vp-p, which is not able to damage any kind of oscilloscope. It is very safe to use.

F. OFFSET switch always sets at OFF position. When adjust DC VOLT, the switch sets at ON position. Turn the knob and able to get maximum +/- 80V DC.

G. AMPL knob provides maximum 35 times Voltage Gain, and maximum output 170Vp-p.

H. Please set Protection Switch always at ON position. It will limit the current within 170mA. When use over 170mA, the switch sets at OFF position.

> ***CAUTION!***
>
> ***It is extremely prohibited to get short, and lower than 190Ω (at 170p-p) loaded output.***

5.2 Use Function Generator as input, and HA-205 output connects to Differential Probe as interface to transmit signal to oscilloscope to observe. (Figure 4.)

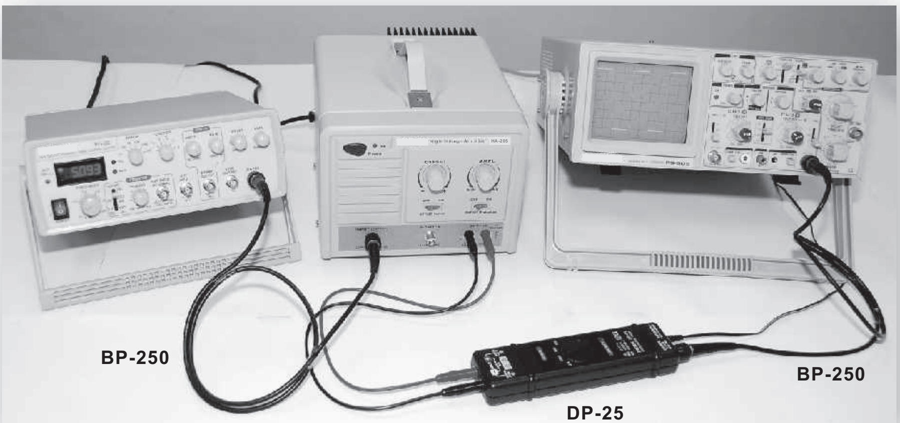


Figure 4.

A. Function Generator and HA-205 setting conditions are the same as 4.1
B. Set Differential Probe maximum input at 1000V. (Please select PINTEK DP-25, maximum input 1400Vp-p)
C. HA-205 output terminal connects with Differential Probe input terminal.
D. Differential Probe output terminal connects to oscilloscope to get the real observation.
E. Oscilloscope indicated value multiply Differential Probe Amplitude is real HA-205 output value.
F. Differential Probe is an isolated tested probe. No matter HA-205 output loaded is positive or negative, HA-205 will not damage any kind of oscilloscopes and very safe to use.

5.3 Use Function Generator as input, to observe the HA-205 Monitor and Output, and the real output situation from oscilloscope. (Figure 5.)

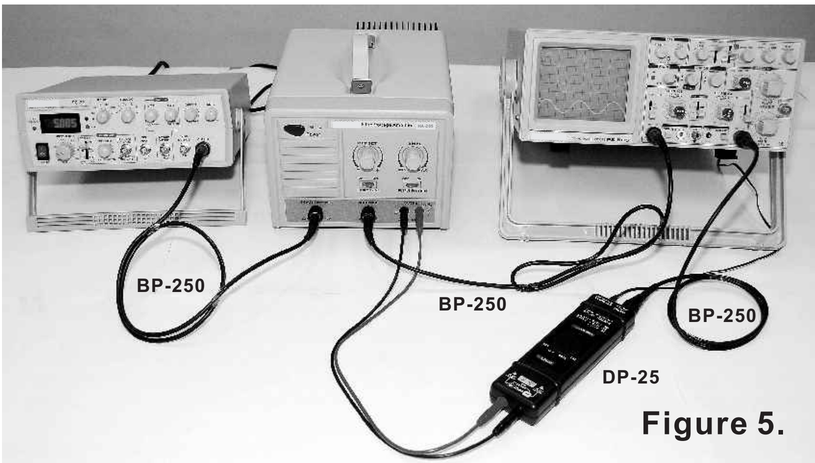


Figure 5.

A. Function Generator and HA-205 setting conditions are the same as 5.1
B. Use BP-250 to connect HA-205 Monitor to oscilloscope CH1.
C. First to connect properly HA-205 output with Differential Probe input. Then, connect Differential Probe output with oscilloscope CH2.
D. Oscilloscope CH1 real measured value needs to multiply 100 times. And CH2 real value is Differential Probe amplitude value multiply oscilloscope vertical voltage value.
E. If connection is properly, CH1 and CH2 values on above “D” procedure shall be the same.

6. MAINTENANCE

For maintenance, only use specified spare parts.
The manufacturer can not be held responsible for any accident arising following a repair made other than its after sales service or approved repairers.

7. CLEANING

Remove any dirt, dust and grime whenever they become noticeable cleaning the outside cover with a soft cloth moistened with a mild cleaning solution.

8. WARRANTY

Unless notified to the contrary, our instruments are guaranteed against any manufacturing defect or material defect. They do not bear the specification known as the safety specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, goes no further than the repair of our faulty equipment, carriage paid to our workshops.

It is applicable for normal use of our instruments, and does not apply to damage or destruction caused, notably by error in mounting, mechanical accident, faulty maintenance, defective use, overload or exceed voltage.
Our responsibility being strictly limited to the pure and simple replacement of the faculty parts of our equipment, the buyer expressly renounces any attempt to find us responsible for damages or losses caused directly or indirectly.

Our guarantee is applicable for twelve (12) months after the date at which the equipment is made available. The repair, modification or replacement of a part during the guarantee period will not result in this guarantee being extended.

9. REPAIR

Maintenance, repairs under or out of guarantee. Please return the product to your distributor.

HA-305

HIGH VOLTAGE AMPLIFIER

1. SUMMARY

HA-305 is a very practical high voltage amplifier in testing and measuring industry. Its dimension is small, light weight and easy operation. The max voltage output is able to reach 300 Vp-p. The various advantages are very useful for users operation.

HA-305 serial current output is able to reach 300 mA, and it has output protection switch. In the output protection mode, it protects HA-305 not damaged when get shorts or overload from outside. This can lower the defects and extend the unit lifetime.

The max voltage gains is 60 times, and the output is able to adjust from 0V ~ 300Vp-p (use 10 turns variable resistor), and maximum frequency is 100KHz (basic voltage output 150 Vp-p). These applications are suitable for different industries,

- Semiconductor High Voltage Driver
- TFT Field High Voltage Driver
- High Voltage Engineering
- MEMS Engineering
- Nano Technology
- PZT Driver
- Static Charge Engineering
- Biomedical Engineering

It is also used for Audio Signal Generator and Function Generator Amplifier.

2. SPECIFICATIONS

(1) Input

Input Voltage:

0 V ~ +/- 2.5 V (5 Vp-p), maximum +/- 10 V (20 Vp-p)

Input Frequency:

DC ~ 100KHz. Over frequency will get attenuate, but not damage the unit.

Input Waveform: Direct current and any waveforms

(2) Output:

Output Voltage:

≦0 V ~ +/- 150 V (300 Vp-p). Direct connect to oscilloscope is PROHIBITED. It is necessary to connect with over 300 V differential probe to observe. For instance, PINTEK DP-25 and DP-50.

Voltage Gain:

≦ 0 ~ 60 times. Front panel indicates AMPL. It is 10 turns adjustable serial resistor.

Maximum Output Current:

≦ 300mA (Protection SW OFF); ≦300mA (Protection SW ON)

Output Bandwidth:≦100KHz (Basic Voltage Output 150Vp-p)

Slow Rate: 50 V/us

Output Resistance:

10Ω(Protection SW OFF); 500Ω(Protection SW ON)

Output Protection: One switch control

Output protection sets “ON”, the output resistance raise up to 500Ω. At this time, even the positive and negative terminals get short but will not damage the unit.

Output protection sets “OFF”, the output resistance down to 10Ω . It is PROHIBITED the output terminals get short. The serial output also needs to set under 300mA. (output 300Vp-p, the overload resistance needs over 500Ω up, to protect the unit from damage)

DC Voltage Offset: ≦0 ~ +/- 150 V DC, it is controlled by 10 turns adjustable resistor.

DC Voltage Offset Switch: One switch control.

When switch sets OFF, inside DC is 0V.

When switch sets ON, front panel indicates OFFSET control.

Monitor Output:

-40dB, the output voltage are about 1/100 as the main output terminal, resistance is 10KΩ, maximum output ≦3 Vp-p. It is able to direct connect to oscilloscope to observe.

(3) Input Power: AC 100 V ~ 240 V +/- 10%, 50 ~ 60 Hz

(4) Power consumption: Max 150 W

(5) Fuse: 3.0A/250, back panel under power core fuse box

(6) Operation: 0~40°C; 0~80%RH

(7) Storage: 20~60°C; 0~90%

(8) Dimension: 270 (W) x 95 (H) x 310 (H) mm

(9) Weight: 5.2 KGs / 11.5 PB

(10) Out Put protection.

(A)Built-in output fuse.

(B)Built-in Output Protect resistor.

Switch "ON" the Protect Switch. The output impedance of the equipment will be raised up to the Desired output resistor. The output current will be limited to protect to the equipment even the output was shorted.

(C) Micro Process Overload Protection:

LED Slow Flash : The equipment was under Warming Up after switch ON or re-switch ON.

LED Quick Flash : The Micro Process have detected the Over Load. The equipment will be switch off and re- switch on automatically. The LED will Slow Flash and than quick flash. The process will be continually till the Over Load been Improved.

3. FRONT PANEL INDICATION

Figure 6.



① **Power On:** Turn on Power and LED light on.

② **DC Voltage OFFSET:** use 10 turns adjustable resistor is able to gain precised voltage. The “OFFSET Switch” must be set at ON position.

③ **AMPL adjustment:** use 10 turns adjustable resistor for micro adjustment. It is able to have 0 ~ 60 times voltage gains.

④ **Input:** ≦ 0 ~ +/- 2.5 V. Maximum do not over +/- 10 V.

⑤ **Oscilloscope Monitor:** Attenuate (100:1) -40dB. Maximum voltage output 3 Vp-p. It is safe to connect with oscilloscope to observe.

⑥ **Output:** It is PROHIBITED to connect with oscilloscope to observe. The maximum output is 300 Vp-p is able to damage any kind of oscilloscopes. It is necessary to connect with over 300 V differential probe to observe. For instance, PINTEK DP-25 and DP-50.

⑦ **DC Voltage OFFSET switch:** When the switch sets "ON", please tune (2) knob. The DC is ≦0~+/- 150V. When switch sets "OFF", it is back to DC 0V.

⑧ **Output Protection Switch:** Suggest to use this function under "Normal" situation. When switch sets "ON" is able to prevent the unit damage from short. When output connects with high voltage, it can resist the voltage. The bandwidth is not attenuate, but the resistance will raise up to 500Ω. Overload will increase and output current will decrease.

When switch sets "OFF", please be careful of using this unit. It is PROHIBITED the output terminals get short.

4. BACK PANEL INDICATION

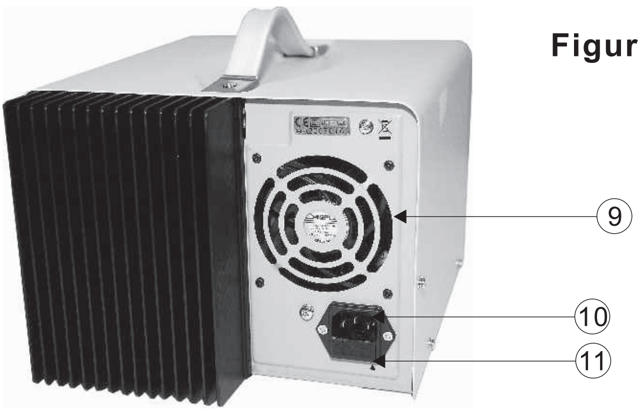


Figure 7.

⑨ **Fans:** suck out type. 24V / DC / 0.11A

⑩ **AC Power plug:** Please connect properly with enclosed power cord.

⑪ **Fuse:**

Power	Frequency	Fuse
100~240V +/- 10%	50/60 Hz	3.0 A/250V

5. OPERATING

5.1 Use Function Generator as input terminal, and directly connect HA-305 Monitor to Oscilloscope to observe the real amplified situation (Figure 8.)

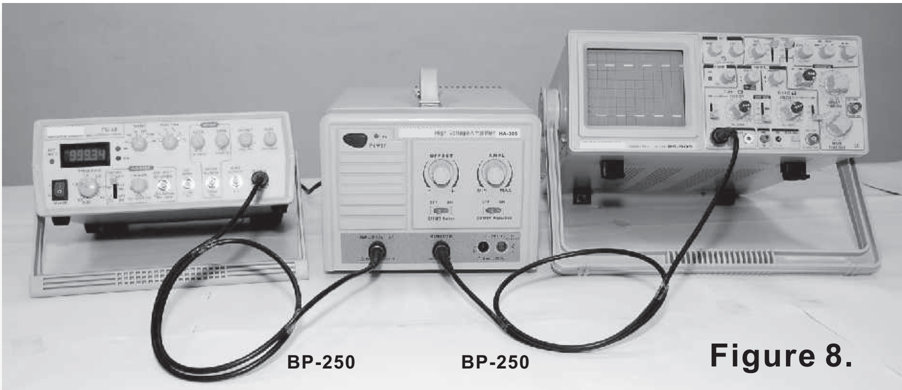


Figure 8.

A. Set Function Generator frequency at 0 ~ 100KHz. (Over frequency will not damage HA-305, but output will be distorted)

B. Waveform Selection: Any

C. Input Amplitude sets within 5Vp-p, but it is safe to set input within 20Vp-p. HA-305 maximum output need to remain at 300Vp-p, over this the waveform will be cut off.

D. Use BP-250 to connect HA-305 Monitor terminal to oscilloscope. The oscilloscope amplitude multiply 100 is HA-305 real output.

E. Monitor terminal maximum output is only 3Vp-p, which is not able to damage any kind of oscilloscope. It is very safe to use.

F. OFFSET switch always sets at OFF position. When adjust DC VOLT, the switch sets at ON position. Turn the knob and able to get maximum +/- 150V DC.

G. AMPL knob provides maximum 60 times Voltage Gain, and maximum output 300Vp-p.

H. Please set Protection Switch always at ON position. It will limit the current within 300mA. When use 300mA at any output voltage, the switch sets at OFF position.

CAUTION!

It is extremely prohibited to get short, and lower 500Ω (at 300p-p)loaded output.

5.2 Use Function Generator as input, and HA-305 output connects to Differential Probe as interface to transmit signal to oscilloscope to observe. (Figure 9.)

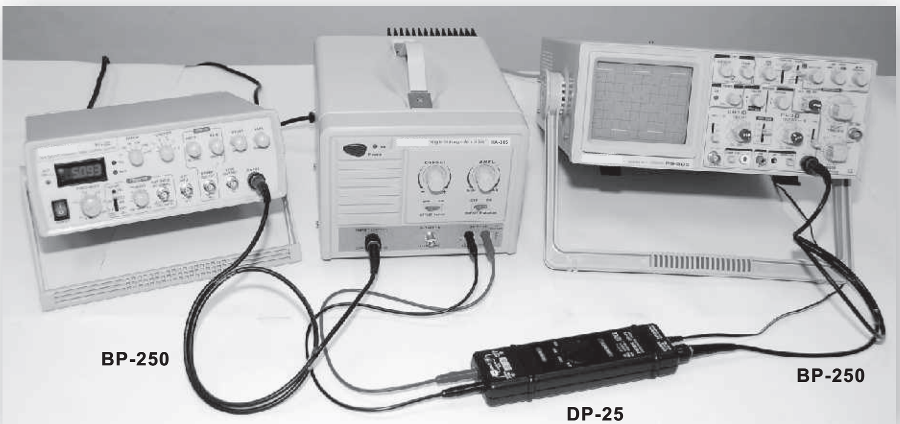


Figure 9.

A. Function Generator and HA-305 setting conditions are the same as 4.1
B. Set Differential Probe maximum input at 1000V. (Please select PINTEK DP-25, maximum input 1400Vp-p)
C. HA-305 output terminal connects with Differential Probe input terminal.
D. Differential Probe output terminal connects to oscilloscope to get the real observation.
E. Oscilloscope indicated value multiply Differential Probe Amplitude is real HA-305 output value.
F. Differential Probe is an isolated tested probe. No matter HA-305 output loaded is positive or negative, HA-305 will not damage any kind of oscilloscopes and very safe to use.

5.3 Use Function Generator as input, to observe the HA-305 Monitor and Output, and the real output situation from oscilloscope. (Figure 10.)

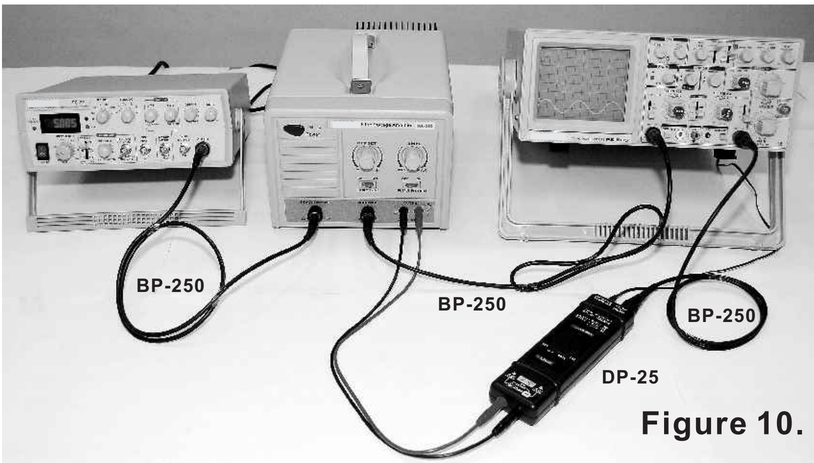


Figure 10.

A. Function Generator and HA-305 setting conditions are the same as 5.1
B. Use BP-250 to connect HA-305 Monitor to oscilloscope CH1.
C. First to connect properly HA-305 output with Differential Probe input. Then, connect Differential Probe output with oscilloscope CH2.
D. Oscilloscope CH1 real measured value needs to multiply 100 times. And CH2 real value is Differential Probe amplitude value multiply oscilloscope vertical voltage value.
E. If connection is properly, CH1 and CH2 values on above “D” procedure shall be the same.

6. MAINTENANCE

For maintenance, only use specified spare parts.
The manufacturer can not be held responsible for any accident arising following a repair made other than its after sales service or approved repairers.

7. CLEANING

Remove any dirt, dust and grime whenever they become noticeable cleaning the outside cover with a soft cloth moistened with a mild cleaning solution.

8. WARRANTY

Unless notified to the contrary, our instruments are guaranteed against any manufacturing defect or material defect. They do not bear the specification known as the safety specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, goes no further than the repair of our faulty equipment, carriage paid to our workshops.

It is applicable for normal use of our instruments, and does not apply to damage or destruction caused, notably by error in mounting, mechanical accident, faulty maintenance, defective use, overload or exceed voltage.
Our responsibility being strictly limited to the pure and simple replacement of the faculty parts of our equipment, the buyer expressly renounces any attempt to find us responsible for damages or losses caused directly or indirectly.

Our guarantee is applicable for twelve (12) months after the date at which the equipment is made available. The repair, modification or replacement of a part during the guarantee period will not result in this guarantee being extended.

9. REPAIR

Maintenance, repairs under or out of guarantee. Please return the product to your distributor.

PINTEK 高壓放大器 選購指南

2010.Apr 05

MODEL	HA-205	HA-305	HA-400	HA-405	HA-800	HA-805
輸出直流電壓 (最大)	± 85V DC	± 150V DC	± 200V DC	± 200V DC	± 400V DC	± 400V DC
輸出交流電壓 (最大)	170Vp-p	300Vp-p	400Vp-p	400Vp-p	800Vp-p	800Vp-p
輸出直流電流 (最大)	± 450mADC	± 300mADC	± 80mADC	± 200mADC	± 35mADC	± 100mADC
輸出交流電流 (最大)	900mAp-p	600mAp-p	160mAp-p	400mAp-p	70mAp-p	200mAp-p
輸出功率 (最大)	76 VA	90 VA	32 VA	80 VA	28 VA	80 VA
頻寬 (Typ.)	3 MHz/100Vp-p	100KHz/150Vp-p	600KHz/200Vp-p	1 MHz/200Vp-p	200KHz/400Vp-p	300KHz/400Vp-p
爬升速率 (Typ.)	2500V/us	50V/us	300V/us	500V/us	200V/us	300V/us
輸出阻抗 (Protection 開關 OFF)	10Ω	10Ω	50Ω	50Ω	100Ω	100Ω
輸出保護用電阻 (Protection 開關 ON)	500Ω/80watt	500Ω/80watt	4KΩ/40watt	2KΩ/80watt	15KΩ/40watt	7.5KΩ/80watt
安全使用負載值上限	≧190Ω/170Vp-p	≧500Ω/300Vp-p	≧2.5KΩ/400Vp-p	≧1KΩ/400Vp-p	≧11KΩ/800Vp-p	≧4KΩ/800Vp-p
輸入波幅(電壓值)上限	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p
AMPL(波幅放大倍數)	0～35	0～60	0～90	0～90	0～180	0～180
OFFSET(可調直流輸出)	0 or ± 80V	0 or ± 150V	0 or ± 200V	0 or ± 200V	0 or ± 400V	0 or ± 400V
Monitor (衰減輸出)	100：1	100：1	100：1	100：1	100：1	100：1
輸出保護裝置	1.Protection SW 保護電阻(開關) 2.微電腦控制過負載保護電路	1.輸出專用 FUSE 2.Protection SW 保護電阻(開關) 3.微電腦控制過負載保護電路	1.輸出專用 FUSE 2.Protection SW 保護電阻(開關)	1.輸出專用 FUSE 2.Protection SW 保護電阻(開關) 3.微電腦控制過負載保護電路	1.輸出專用 FUSE 2.Protection SW 保護電阻(開關)	1.輸出專用 FUSE. 2.Protection SW 保護電阻(開關) 3.微電腦控制過負載保護電路

HA-205

高壓放大器

HA-205 高壓放大器

1. 簡述:

HA-205是一台非常實用的高電壓訊號放大器, 它具有最小的體積、最輕的重量及最簡易的操做.非常高的電壓輸出(170Vp-p)等優點。

本機連續輸出電流量最大值達到450 mA, 還有輸出保護開關, 當選擇保護輸出時能確保本機不會外部短路, 或外部電壓回饋而損壞, 因此可大幅降低不良率,延長本機的使用壽命。電壓放大增益高達35倍, 輸出從0V ~ 170Vp-p無限段調整(使用10轉的大型可變電阻), 頻寬高達4MHz(基準電壓100Vp-p輸出), 非常適合半導體高壓驅動、TFT產業高壓驅動、各種高壓工程、微機電工程、奈米科技、壓電材料驅動、靜電科技工程、生醫檢測工程等應用; 也很適合當作音頻信號產生器或函數波形產生器的波形放大之用。

2. 規格:

(1) 輸入端:

指定輸入電壓: 0 V ~ +/- 2.5 V (5 Vp-p), 最大不得超過+/- 10 V (20 Vp-p)

指定輸入頻率: DC ~ 4MHz, 太高的頻率將會被衰減, 不會對本機造成損壞, 請放心使用。

輸入波形: 直流及任何波形。

(2) 輸出端:

輸出電壓: ≦0 V ~ +/- 85 V DC (170 Vp-p)

放大增益: ≦0 ~ 35倍, 面板標示AMPL, 由大型10轉可變電阻組成連續可變。

最大輸出電流: ≦450mA (保護開關OFF時); ≦170mA (保護開關ON時)

輸出阻抗: 10Ω(保護開關OFF時); 500Ω(保護開關ON時)

爬升數率: 2500V/us(Typ.)

輸出頻寬: DC~4MHz (基準電壓100Vp-p輸出)
輸出保護:
由一組開關控制, 當輸出保護設定爲ON時, 輸出阻抗指定提升爲500Ω, 此刻使用中輸出端兩極不慎短路也不會損壞本機, 但是如果"輸出保護"設定爲OFF時, 輸出阻抗立刻降爲"10Ω", 此時嚴禁輸出端短路,連續輸出也要控制在450mA以下(換算170 Vp-p 輸出時負載阻抗必須大於190Ω, 才不會造成本機損壞)。
直流抵補: ≦0 ~ +/- 80 V DC, 由10 轉大型可變電阻操控。
直流抵補開關:
由一只開關選擇, 當開關選擇爲OFF時, 內部設定DC爲0V, 當開關設定ON時, 由面板標示OFFSET旋鈕控制。
監視輸出:
-40dB, 約爲輸出端的 1/100 電壓位, 輸出阻抗爲10KΩ, 最大輸出≦1.7 Vp-p, 因此可以直接連接到示波器觀測波形。

(3) 電源輸入: AC 100 V ~ 240 V +/- 10%, 50 ~ 60 Hz
(4) 電源消耗: 最大150 W
(5) 保險絲: 指定使用 3.0A / 250V, 放置於後鐵板電源線輸入下方Fuse專用盒。
(6) 操作溫濕度: 0~40°C; 0~80%RH
(7) 儲存溼濕度: -20~60°C; 0~90%
(8) 尺寸: 270(寬) x 95(高) x 310(深) mm
(9) 重量: 5.2KGS/11.5PB
(10)輸出保護裝置:
(A)輸出保護電阻: 藉由Output Protection SW ON 輸出阻抗提高到預設的保護電阻, 因此短路電流會限制在安全範圍, 但是頻寬也會稍微被壓縮。
(B)微電腦過載保護裝置:
LED慢閃: 開機預熱中或重新開機中。
LED急閃: 微電腦偵測到過負載信號, 此時會立卽將切開輸出電路, 之後會重新開機。

3. 前面板指示說明

圖1.



① 電源開關: 電源ON時旁邊LED燈亮起。

② 直流抵補偏壓(OFFSET): 使用大型10轉的可變電阻, 能獲得更精確的電壓, 使用時必須先將(7)OFFSET Switch設定在ON的位置。

③ 振幅調整(AMPL): 使用大型10轉的可變電阻有微調的效果, 能獲得0-35倍的電壓增益。

④ 輸入端: 正常使用≦0~+/- 2.5V , 最大不能超過+/- 10V

⑤ 示波器監看端(MONITOR): 衰減比例(100:1)-40dB, 因為最大輸出電壓僅1.7Vp-p因此能安全的連接在示波器觀測波形。

⑥ 輸出端: 0~170 Vp-p 或 0~+/- 85 V DC

⑦ 直流抵補偏壓(OFFSET)開關: 當開關設定爲ON, 轉動(2)旋鈕, 可以獲得 ≦0~+/- 80V的DC偏壓, 當開關設定爲OFF, 電路將自動恢復DC 0V。

⑧ 輸出保護開關: 建議一般使用狀況下將開關設定在ON, 可以避免輸出端不愼短路造成本機損壞, 或是輸出端接在更高的電路上時, 有反饋的電壓將會被有效的阻擋, 本裝置衰減頻寬有限, 但是會提高輸出阻抗爲500Ω, 負載效應將會適度提高, 最大輸出電流也會適度限縮, 如果將開關設定在OFF請更小心的使用本機, 嚴禁輸出端短路, 或是測試端更高的電壓侵入造成損壞。

4. 後蓋指示說明:

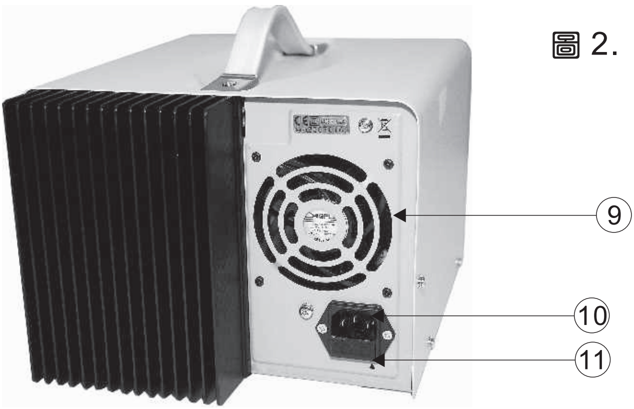


圖 2.

⑨ 散熱風扇: 吸出型, 使用24V/DC/0.11A

⑩ AC電源輸入座: 請將隨機附的電源線插入, 並確實插妥。

⑪ 保險絲座:

電源	頻率	保險絲
100~240V +/- 10%	50/60 Hz	3.0 A/250V

5. 操作說明

5.1 使用函數波產生器當輸入，HA-205的Monitor 端子直接接到示波器觀測，放大實況。(如圖3)

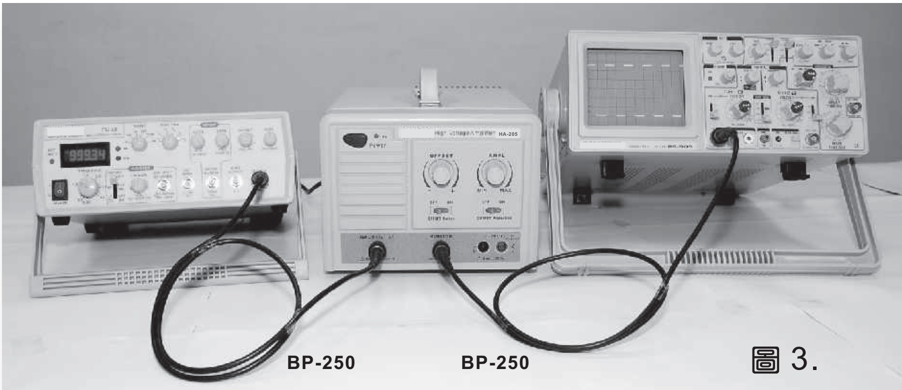


圖 3.

A. 將函數波形產生器的頻率設定在0 ~ 3MHz。(頻率超過不會對HA-205產生任何破壞，但輸出會壓縮及變形)

B. 波形選擇不受限制。

C. 振幅原則是限縮在5Vp-p，但20Vp-p輸入也是安全的，可是放大器的最大輸出仍保持170Vp-p, 超過將會被剪裁。

D. 使用Cable線(BP-250) 將Monitor 端子與示波器連結, 示波器顯示的振幅 x 100倍就是HA-205的Output實況輸出。

E. Monitor 端子最大輸出僅1.7Vp-p，不會對任何的示波器造成損壞，請放心使用。

F. OFFSET Switch 平常SET 在OFF位置，當需要調整偏壓時才將開關SET在ON位置，並同時旋轉旋鈕可獲得最大值 +/- 80VDC的改變。

G. AMPL旋鈕提供最大35倍電壓增益及170Vp-p的最大輸出。

H. 保護開關請平常SET在ON處，可限制電流在170mA內，這個額度不敷使用時，請改SET在OFF處, 但仍嚴禁短路，以及禁止低於190Ω(170Vp-p時)的輸出負載。

5.2 使用函數波形產生器當輸入, HA-205的OUT PUT端透過差動測試棒當介面傳輸到示波器觀測。(如圖4)

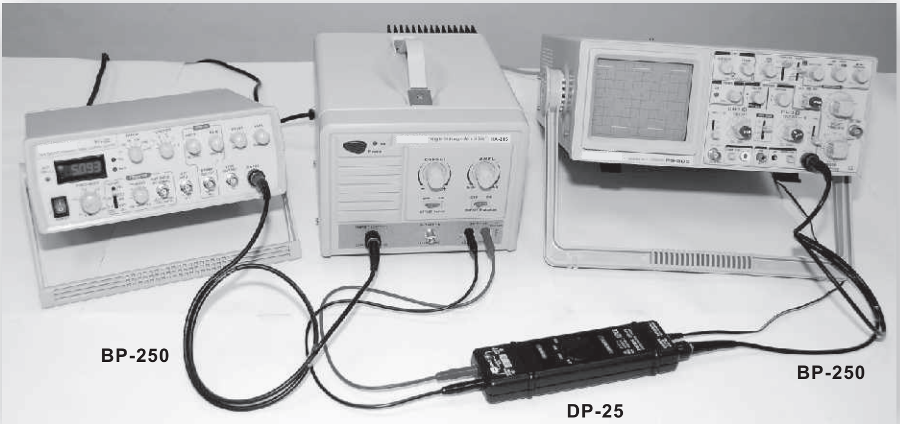


圖 4.

A. 函數波形產生器及HA-205的設定條件全部與5.1項相同。

B. 差動測試棒請直接選用最大輸入1000Vp-p 左右的比較適用。(如PINTEK DP-25最大輸入1400Vp-p)

C. HA-205 的輸出端連結到差動測試棒的輸入端。

D. 差動測試棒的輸出端連結到示波器做實際放大觀測。

E. 示波器顯示值乘以差動測試棒的衰減量即爲實際HA-205的輸出值。

F. 差動測試棒是絕緣型的測試棒, 不管HA-205輸出電荷有多正多負都不會破壞示波器, 請放心使用。

5.3 使用函數波形產生器當輸入，並同時在HA-205的Monitor 及Output 同時在示波器觀測放大實況。(如圖5)

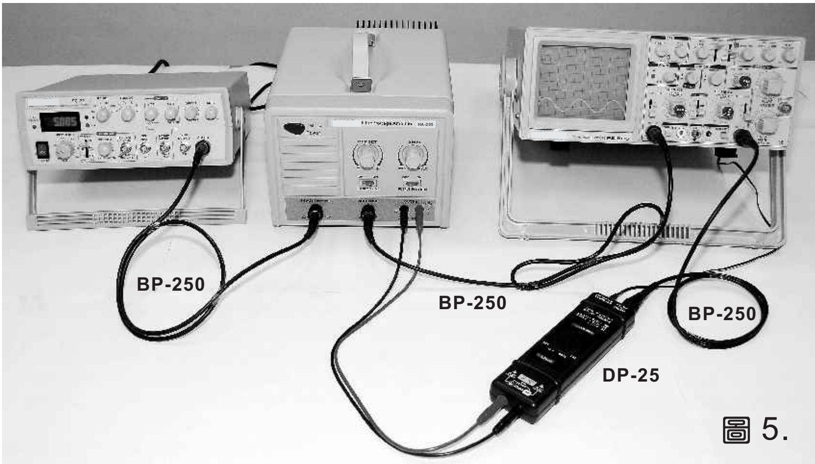


圖 5.

A. 函數波形產生器及HA-205的設定條件同5.1。

B. HA-205的Monitor直接透過Cable 線(BP-250)與示波器 CH1連接。

C. HA-205的Output端必須先與差動測試棒的輸入端接妥後再從差動測試棒的輸出端連接到示波器的CH2。

D. 示波器CH1的實際量測值需x 100倍，但示波器CH2的實際值要依差動測試棒指示衰減量乘示波器垂直電壓即可。

E. 若連接的方法無誤，以上"D"項CH1 及 CH2換算後的值必須相同。

6. 維護:

保養此產品時請使用原廠指定的工具,原廠將不負任何責任由其他不被認可的維修人員所做的維修。

本產品如超過60天不使用,請將電源線拔除並各別存放。

7. 清潔:

請用少許的清潔濟倒在柔軟微濕的軟布上輕輕的將灰塵及髒污清理掉。

8. 保固:

除了在人爲上的特意損壞,本產品是受保固並可以維修的,並不包含在安全規範的責任。
保固是以不超出發票上的金額,零件的更換及運送的費用。
保固是僅在正常操作下而造成的損壞,並不包含任何刻意的損壞,操作上的錯誤,機械上的操作不當,保養不當,負載或過壓。
原廠的保固僅包含有限的單純更換損壞的零件,使用者將不可歸據直接或間接的責任在原廠。
原廠的保固是賣出後的12個月內,如有任意的非原廠的維修或更換零件,原廠保固將自然取消。

9. 維修:

有任何的維修,保養或更換零件是在保固以外,請將產品退回原廠維修。

HA-305

高 壓 放 大 器

HA-305 高壓放大器

1. 簡述:

HA-305是一台非常實用的高電壓訊號放大器, 它具有最小的體積、最輕的重量及最簡易的操做, 非常高的電壓輸出(300Vp-p)等優點。

本機連續輸出電流量最大值達到300 mA, 還有輸出保護開關, 當選擇保護輸出時能確保本機不會外部短路, 或外部電壓回饋而損壞, 因此可大幅降低不良率, 延長本機的使用壽命。電壓放大增益高達60倍, 輸出從0V ~ 300Vp-p無限段調整(使用10轉的大型可變電阻), 頻寬高達100KHz(基準電壓150Vp-p輸出), 非常適合半導體高壓驅動、TFT產業高壓驅動、各種高壓工程、微機電工程、奈米科技、壓電材料驅動、靜電科技工程、生醫檢測工程等應用; 也很適合當作音頻信號產生器或函數波形產生器的波形放大之用。

2. 規格:

(1) 輸入端:

指定輸入電壓: 0 V ~ +/- 2.5 V (5 Vp-p), 最大不得超過+/- 10 V (20 Vp-p)

指定輸入頻率: DC ~ 100KHz, 太高的頻率將會被衰減, 不會對本機造成損壞, 請放心使用。

輸入波形: 直流及任何波形。

(2) 輸出端:

輸出電壓:

≦0 V ~ +/- 150 V DC (300 Vp-p), 嚴禁直接連結到示波器觀測, 必須另行選購耐壓400V以上的差動測試棒轉接觀測, 如DP-25, DP-50等。

放大增益: ≦0 ~ 60倍, 面板標示AMPL, 由大型10轉可變電阻組成連續可變。

最大輸出電流: ≦300mA (保護開關OFF時); ≦300mA (保護開關ON時)

輸出阻抗: 10Ω(保護開關OFF時); 500Ω(保護開關ON時)

爬升數率: 50V/us

輸出頻寬: DC~100KHz (基準電壓150Vp-p輸出)
輸出保護:
由一組開關控制, 當輸出保護設定爲ON時, 輸出阻抗指定提升爲500Ω, 此刻使用中輸出端兩極不慎短路也不會損壞本機， 但是如果"輸出保護"設定爲OFF時, 輸出阻抗立刻降爲"10Ω", 此時嚴禁輸出端短路, 連續輸出也要控制在300mA以下(換算300 Vp-p 輸出時負載阻抗必須大於500Ω, 才不會造成本機損壞)。
直流抵補: ≦0 ~ +/- 150 V DC, 由10 轉大型可變電阻操控。
直流抵補開關:
由一只開關選擇, 當開關選擇爲OFF時, 內部設定DC爲0V, 當開關設定ON時, 由面板標示OFFSET旋鈕控制。
監視輸出:
-40dB, 約爲輸出端的 1/100 電壓位, 輸出阻抗爲10KΩ, 最大輸出≦3 Vp-p, 因此可以直接連接到示波器觀測波形。

(3) 電源輸入: AC 100 V ~ 240 V +/- 10%, 50 ~ 60 Hz
(4) 電源消耗: 最大150 W
(5) 保險絲: 指定使用 3.0A / 250V, 放置於後鐵板電源線輸入下方Fuse專用盒。
(6) 操作溫濕度: 0~40°C; 0~80%RH
(7) 儲存溼濕度: -20~60°C; 0~90%
(8) 尺寸: 270(寬) x 95(高) x 310(深) mm
(9) 重量: 5.2KGS/11.5PB
(10)輸出保護裝置:
(A)內置輸出保險絲。
(B)輸出保護電阻: 藉由Output Protection SW ON 輸出阻抗提高到預設的保護電阻, 因此短路電流會限制在安全範圍。
(C)微電腦過載保護裝置:
LED慢閃: 開機預熱中或重新開機中。
LED急閃: 微電腦偵測到過負載信號, 此時會立即將切開輸出電路, 之後會重新開機。

3. 前面板指示說明

圖6.



① 電源開關: 電源ON時旁邊LED燈亮起。

② 直流抵補偏壓(OFFSET): 使用大型10轉的可變電阻, 能獲得更精確的電壓, 使用時必須先將(7)OFFSET Switch設定在ON的位置。

③ 振幅調整(AMPL): 使用大型10轉的可變電阻有微調的效果, 能獲得0-60倍的電壓增益。

④ 輸入端: 正常使用≦0~+/- 2.5V , 最大不能超過+/- 10V

⑤ 示波器監看端(MONITOR): 衰減比例(100:1)-40dB.因爲最大輸出電壓僅3Vp-p因此能安全的連接在示波器觀測波形。

⑥ 輸出端: 禁止直接連結于示波器觀測波形, 因爲最大輸出高達300Vp-p有可能擊毀示波器, 請另外選購耐電壓400V以上的差動測試棒量測, 如DP-25或DP-50等。

⑦ 直流抵補偏壓(OFFSET)開關: 當開關設定為ON, 轉動(2)旋鈕, 可以獲得≦0~+/- 150V的DC偏壓, 當開關設定為OFF, 電路將自動恢復DC 0V。

⑧ 輸出保護開關: 建議一般使用狀況下將開關設定在ON, 可以避免輸出端不慎短路造成本機損壞, 或是輸出端接在更高的電路上時, 有反饋的電壓將會被有效的阻擋, 本裝置不會衰減頻寬, 但是會提高輸出阻抗為500Ω, 負載效應將會適度提高, 最大輸出電流也會適度限縮, 如果將開關設定在OFF請更小心的使用本機, 嚴禁輸出端短路, 或是測試端更高的電壓侵入造成損壞。

4. 後蓋指示說明:

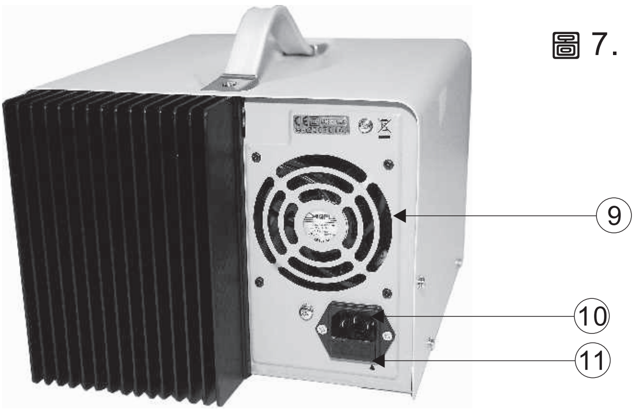


圖 7.

⑨ 散熱風扇: 吸出型, 使用24V/DC/0.11A

⑩ AC電源輸入座: 請將隨機附的電源線插入, 並確實插妥。

⑪ 保險絲座:

電源	頻率	保險絲
100~240V +/- 10%	50/60 Hz	3.0 A/250V

5. 操作說明

5.1 使用函數波產生器當輸入，HA-305的Monitor 端子直接接到示波器觀測，放大實況。(如圖8)

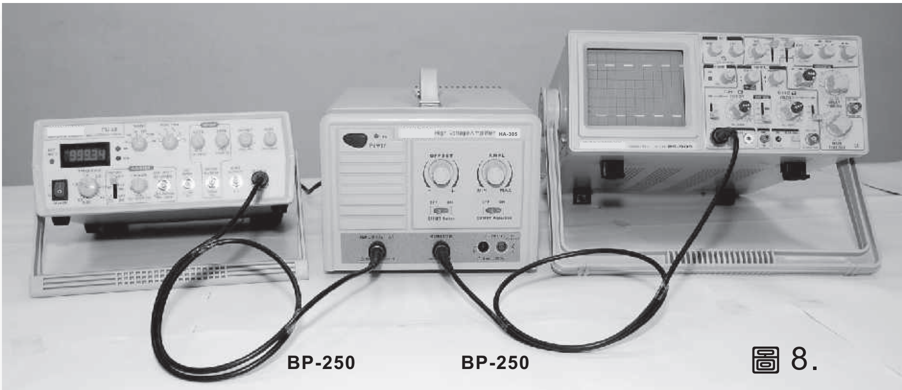


圖 8.

A. 將函數波形產生器的頻率設定在0 ~ 100KHz。(頻率超過不會對HA-305產生任何破壞，但輸出會壓縮及變形)

B. 波形選擇不受限制。

C. 振幅原則是限縮在5Vp-p，但20Vp-p輸入也是安全的，可是放大器的最大輸出仍保持300Vp-p，超過將會被剪裁。

D. 使用Cable線(BP-250) 將Monitor 端子與示波器連結，示波器顯示的振幅 x 100倍就是HA-305的Output實況輸出。

E. Monitor 端子最大輸出僅3Vp-p，不會對任何的示波器造成損壞，請放心使用。

F. OFFSET Switch 平常SET 在OFF位置，當需要調整偏壓時才將開關SET在ON位置，並同時旋轉旋鈕可獲得最大値 +/- 150VDC的改變。

G. AMPL旋鈕提供最大60倍電壓增益及300Vp-p的最大輸出。

H. 保護開關請平常SET在ON處，可限制電流在300mA內，如果您希望任何電壓輸出，均能達到300mA電流量，請改SET在OFF處，但仍嚴禁短路，以及低於500Ω(400Vp-p)的輸出負載。

5.2 使用函數波形產生器當輸入，HA-305的OUT PUT端透過差動測試棒當介面傳輸到示波器觀測。(如圖9)

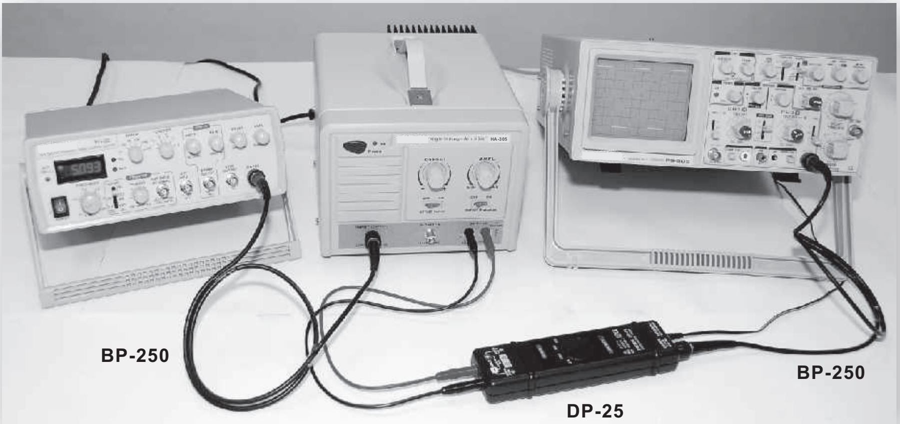


圖 9.

A. 函數波形產生器及HA-305的設定條件全部與5.1項相同。

B. 差動測試棒請直接選用最大輸入1000Vp-p 左右的比較適用。(如PINTEK DP-25最大輸入1400Vp-p)

C. HA-305 的輸出端連結到差動測試棒的輸入端。

D. 差動測試棒的輸出端連結到示波器做實際放大觀測。

E. 示波器顯示值乘以差動測試棒的衰減量即爲實際HA-305的輸出值。

F. 差動測試棒是絕緣型的測試棒，不管HA-305輸出電荷有多正多負都不會破壞示波器，請放心使用。

5.3 使用函數波形產生器當輸入，並同時在HA-305的Monitor
及Output 同時在示波器觀測放大實況。(如圖10)

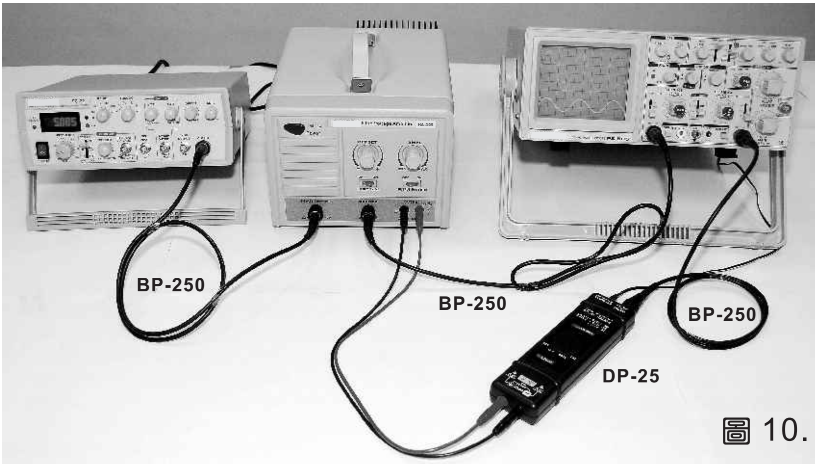


圖 10.

A. 函數波形產生器及HA-305的設定條件同5.1。

B. HA-305的Monitor直接透過Cable 線(BP-250)與示波器CH1連接。

C. HA-305的Output端必須先與差動測試棒的輸入端接妥後再從差動測試棒的輸出端連接到示波器的CH2。

D. 示波器CH1的實際量測值需x 100倍，但示波器CH2的實際值要依差動測試棒指示衰減量乘示波器垂直電壓即可。

E. 若連接的方法無誤，以上"D"項CH1 及 CH2換算後的值必須相同。

6. 維護:

保養此產品時請使用原廠指定的工具,原廠將不負任何責任由其他不被認可的維修人員所做的維修。

本產品如超過60天不使用,請將電源線拔除並各別存放。

7. 清潔:

請用少許的清潔濟倒在柔軟微濕的軟布上輕輕的將灰塵及髒污清理掉。

8. 保固:

除了在人爲上的特意損壞,本產品是受保固並可以維修的,並不包含在安全規範的責任。
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保固是僅在正常操作下而造成的損壞,並不包含任何刻意的損壞,操作上的錯誤,機械上的操作不當,保養不當,負載或過壓。
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9. 維修:

有任何的維修,保養或更換零件是在保固以外,請將產品退回原廠維修。